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## PATENT COOPERATION TREATY

m4

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING  
SUBMISSION OR TRANSMITTAL  
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

HUMPHRIES, Martyn  
ICI Group Intellectual Property  
P.O. Box 90  
Wilton  
Middlesbrough  
Cleveland TS90 3JE  
ROYAUME-UN

RECEIVED  
14 APR 1999

Date of mailing (day/month/year) 08 April 1999 (08.04.99)	
Applicant's or agent's file reference MTW 50542/WO	IMPORTANT NOTIFICATION
International application No. PCT/GB99/00145	International filing date (day/month/year) 15 January 1999 (15.01.99)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 16 January 1998 (16.01.98)
Applicant QUEST INTERNATIONAL B.V. et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk (\*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
16 Janu 1998 (16.01.98)	98300291.6	EP	25 Marc 1999 (25.03.99)

finalized diary

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No. (41-22) 740.14.35	Authorized officer  Juan Cruz  Telephone No. (41-22) 338.83.38
--	--

## TENT COOPERATION TRE, Y

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
 United States Patent and Trademark  
 Office  
 Box PCT  
 Washington, D.C.20231  
 ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

01 September 1999 (01.09.99)

International application No.

PCT/GB99/00145

Applicant's or agent's file reference

MTW 50542/WO

International filing date (day/month/year)

15 January 1999 (15.01.99)

Priority date (day/month/year)

16 January 1998 (16.01.98)

Applicant

BERRY, Mark, John et al

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

28 July 1999 (28.07.99)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
 34, chemin des Colombettes  
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

C. Carrié

Telephone No.: (41-22) 338.83.38

## F ENT COOPERATION TREA

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

KEITH W NASH & CO  
90-92 Regent Street  
Cambridge CB2 1DP  
ROYAUME-UNIDate of mailing (day/month/year)  
25 November 1999 (25.11.99)Applicant's or agent's file reference  
HCM/UK/C382.02/U

## IMPORTANT NOTIFICATION

International application No.  
PCT/GB99/00145International filing date (day/month/year)  
15 January 1999 (15.01.99)

1. The following indications appeared on record concerning:

☐

the applicant

☐

the inventor

☒

the agent

☐

the common representative

Name and Address

HUMPHRIES, Martyn  
ICI Group Intellectual Property  
P.O. Box 90  
Wilton  
Middlesbrough  
Cleveland TS90 8JE  
United Kingdom

State of Nationality

State of Residence

Telephone No.

(01642) 436286

Facsimile No.

(01642) 436146

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒

the person

☐

the name

☐

the address

☐

the nationality

☐

the residence

Name and Address

KEITH W NASH & CO  
90-92 Regent Street  
Cambridge CB2 1DP  
United Kingdom

State of Nationality

State of Residence

Telephone No.

(01223) 355477

Facsimile No.

(01223) 324353

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒

the receiving Office

☐

the International Searching Authority

☒

the International Preliminary Examining Authority

☐

the designated Offices concerned

☒

the elected Offices concerned

☒

other: HUMPHRIES, Martyn

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Authorized officer

F. Gateau

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

PC.

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

F iving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum)

MTW 50542/WO

## Box No. I TITLE OF INVENTION

IMPROVEMENTS IN OR RELATING TO BINDING OF POLYSACCHARIDES

## Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

QUEST INTERNATIONAL B.V.  
Huizerstraatweg 28  
1411 GP Naarden  
Netherlands

☐ This person is also inventor.

Telephone No.

(01642) 436286

Facsimile No.

(01642) 436146

Teleprinter No.

94028500 ICIC G

State (that is, country) of nationality:

NL

State (that is, country) of residence:

NL

This person is applicant  
for the purposes of:☐ all designated  
States☒ all designated States except  
the United States of America☐ the United States  
of America only☐ the States indicated in  
the Supplemental Box

## Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

BERRY, Mark John  
2 Fitzwilliam Leys  
Higham Ferrers  
Rushden  
Northamptonshire NN10 8LY, United Kingdom

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box  
is marked, do not fill in below.)

State (that is, country) of nationality:

GB

State (that is, country) of residence:

GB

This person is applicant  
for the purposes of:☐ all designated  
States☐ all designated States except  
the United States of America☒ the United States  
of America only☐ the States indicated in  
the Supplemental Box☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

## Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

HUMPHRIES, Martyn  
ICI Group Intellectual Property  
PO Box 90, Wilton, Middlesbrough  
Cleveland, TS90 8JE  
United Kingdom

Telephone No.

(01642) 436286

Facsimile No.

(01642) 436146

Teleprinter No.

94028500 ICIC G

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

## Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

*If none of the following sub-boxes is used, this sheet should not be included in the request.*

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

GIDLEY, Michael John  
45 Holmes Avenue  
Raunds  
Northamptonshire NN9 6SZ  
United Kingdom

This person is:

- ☐ applicant only  
☒ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

GB

State (that is, country) of residence:

GB

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

DAVIS, Paul James  
The Hawthorns  
Pavenham Road  
Felmersham  
Bedfordshire MK43 7EX  
United Kingdom

This person is:

- ☐ applicant only  
☒ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

GB

State (that is, country) of residence:

GB

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

**B x No. DESIGNATION OF STATES**

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

**Regional Patent**

- ☒ **AP** ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA** Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA** OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

**National Patent (if other kind of protection or treatment desired, specify on dotted line):**

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> <b>AL</b> Albania .....                               | <input type="checkbox"/> <b>LS</b> Lesotho .....  |
| <input checked="" type="checkbox"/> <b>AM</b> Armenia .....                               | <input checked="" type="checkbox"/> <b>LT</b> Lithuania .....                                 |
| <input checked="" type="checkbox"/> <b>AT</b> Austria .....                               | <input checked="" type="checkbox"/> <b>LU</b> Luxembourg .....                                |
| <input checked="" type="checkbox"/> <b>AU</b> Australia .....                             | <input checked="" type="checkbox"/> <b>LV</b> Latvia .....                                    |
| <input checked="" type="checkbox"/> <b>AZ</b> Azerbaijan .....                            | <input checked="" type="checkbox"/> <b>MD</b> Republic of Moldova .....                       |
| <input checked="" type="checkbox"/> <b>BA</b> Bosnia and Herzegovina .....                | <input checked="" type="checkbox"/> <b>MG</b> Madagascar .....                                |
| <input checked="" type="checkbox"/> <b>BB</b> Barbados .....                              | <input checked="" type="checkbox"/> <b>MK</b> The former Yugoslav Republic of Macedonia ..... |
| <input checked="" type="checkbox"/> <b>BG</b> Bulgaria .....                              | <input type="checkbox"/> <b>MN</b> Mongolia .....   |
| <input checked="" type="checkbox"/> <b>BR</b> Brazil .....                                | <input type="checkbox"/> <b>MW</b> Malawi .....   |
| <input checked="" type="checkbox"/> <b>BY</b> Belarus .....                               | <input checked="" type="checkbox"/> <b>MX</b> Mexico .....                                    |
| <input checked="" type="checkbox"/> <b>CA</b> Canada .....                                | <input checked="" type="checkbox"/> <b>NO</b> Norway .....                                    |
| <input checked="" type="checkbox"/> <b>CH and LI</b> Switzerland and Liechtenstein .....  | <input checked="" type="checkbox"/> <b>NZ</b> New Zealand .....                               |
| <input checked="" type="checkbox"/> <b>CN</b> China .....                                 | <input checked="" type="checkbox"/> <b>PL</b> Poland .....                                    |
| <input checked="" type="checkbox"/> <b>CU</b> Cuba .....                                  | <input checked="" type="checkbox"/> <b>PT</b> Portugal .....                                  |
| <input checked="" type="checkbox"/> <b>CZ</b> Czech Republic .....                        | <input checked="" type="checkbox"/> <b>RO</b> Romania .....                                   |
| <input checked="" type="checkbox"/> <b>DE</b> Germany .....                               | <input checked="" type="checkbox"/> <b>RU</b> Russian Federation .....                        |
| <input checked="" type="checkbox"/> <b>DK</b> Denmark .....                               | <input checked="" type="checkbox"/> <b>SD</b> Sudan .....                                     |
| <input checked="" type="checkbox"/> <b>EE</b> Estonia .....                               | <input checked="" type="checkbox"/> <b>SE</b> Sweden .....                                    |
| <input checked="" type="checkbox"/> <b>ES</b> Spain .....                                 | <input checked="" type="checkbox"/> <b>SG</b> Singapore .....                                 |
| <input checked="" type="checkbox"/> <b>FI</b> Finland .....                               | <input checked="" type="checkbox"/> <b>SI</b> Slovenia .....                                  |
| <input checked="" type="checkbox"/> <b>GB</b> United Kingdom .....                        | <input checked="" type="checkbox"/> <b>SK</b> Slovakia .....                                  |
| <input checked="" type="checkbox"/> <b>GE</b> Georgia .....                               | <input checked="" type="checkbox"/> <b>SL</b> Sierra Leone .....                              |
| <input checked="" type="checkbox"/> <b>GH</b> Ghana .....                                 | <input checked="" type="checkbox"/> <b>TJ</b> Tajikistan .....                                |
| <input checked="" type="checkbox"/> <b>GM</b> Gambia .....                                | <input checked="" type="checkbox"/> <b>TM</b> Turkmenistan .....                              |
| <input type="checkbox"/> <b>GW</b> Guinea-Bissau .....                                    | <input checked="" type="checkbox"/> <b>TR</b> Turkey .....                                    |
| <input checked="" type="checkbox"/> <b>HR</b> Croatia .....                               | <input checked="" type="checkbox"/> <b>TT</b> Trinidad and Tobago .....                       |
| <input checked="" type="checkbox"/> <b>HU</b> Hungary .....                               | <input checked="" type="checkbox"/> <b>UA</b> Ukraine .....                                   |
| <input checked="" type="checkbox"/> <b>ID</b> Indonesia .....                             | <input checked="" type="checkbox"/> <b>UG</b> Uganda .....                                    |
| <input checked="" type="checkbox"/> <b>IL</b> Israel .....                                | <input checked="" type="checkbox"/> <b>US</b> United States of America .....                  |
| <input checked="" type="checkbox"/> <b>IS</b> Iceland .....                               | <input type="checkbox"/> <b>UZ</b> Uzbekistan .....   |
| <input checked="" type="checkbox"/> <b>JP</b> Japan .....                                 | <input checked="" type="checkbox"/> <b>VN</b> Viet Nam .....                                  |
| <input checked="" type="checkbox"/> <b>KE</b> Kenya .....                                 | <input checked="" type="checkbox"/> <b>YU</b> Yugoslavia .....                                |
| <input checked="" type="checkbox"/> <b>KG</b> Kyrgyzstan .....                            | <input checked="" type="checkbox"/> <b>ZW</b> Zimbabwe .....                                  |
| <input checked="" type="checkbox"/> <b>KP</b> Democratic People's Republic of Korea ..... |   |
| <input checked="" type="checkbox"/> <b>KR</b> Republic of Korea .....                     |   |
| <input checked="" type="checkbox"/> <b>KZ</b> Kazakhstan .....                            |   |
| <input checked="" type="checkbox"/> <b>LC</b> Saint Lucia .....                           |   |
| <input checked="" type="checkbox"/> <b>LK</b> Sri Lanka .....                             |   |
| <input checked="" type="checkbox"/> <b>LR</b> Liberia .....                               |   |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☒ **INDIA** .....
- ☐ .....

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental B x as being excluded from the scope of this statement. The applicant declares that these additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

1. If, in any of the Boxes, the space [indicate the number of the Box] and for the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:

- (i) If more than two persons are involved as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;
  - (ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;
  - (iii) if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
  - (iv) if, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
  - (v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
  - (vi) if, in Box No. VI, there are more than three earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI;
  - (vii) if, in Box No. VI, the earlier application is an ARIPO application: in such case, write "Continuation of Box No. VI", specify the number of the item corresponding to that earlier application and indicate at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed.
2. If, with regard to the precautionary designation statement contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.
3. If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning non-prejudicial disclosures or exceptions to lack of novelty: in such case, write "Statement concerning non-prejudicial disclosures or exceptions to lack of novelty" and furnish that statement below.

#### CONTINUATION OF BOX NO. IV

COLLINGWOOD, Anthony Robert  
 GRAHAM, John George  
 GRATWICK, Christopher

GIBSON, Sara Hillary Margaret  
 HUMPHRIES, Martyn  
 MILLROSS, Christopher Robert  
 ROBERTS, Jonathan Winstanley  
 THOMAS, Ieuan



## Box No. VI PRIORITY CLAIM

☐ Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) 16.1.98 16 January 1998	98300291.6	EP		
item (2)				
item (3)				

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

## Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used)

ISA /

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority)

Date (day/month/year)

Number

Country (or regional Office)

## Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request : 5  
description (excluding sequence listing part) : 10  
claims : 1  
abstract : 1  
drawings : -  
sequence listing part of description : -

Total number of sheets : 17

This international application is accompanied by the item(s) marked below:

1. ☒ fee calculation sheet
2. ☒ separate signed power of attorney TO FOLLOW
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☒ priority document(s) identified in Box No. VI as item(s): TO FOLLOW
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☐ other (specify):

Figure of the drawings which should accompany the abstract:

Language of filing of the international application:

ENGLISH

## Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

HUMPHRIES, MARTYN  
AGENT

1. Date of actual receipt of the purported international application:

For receiving Office use only

3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:

4. Date of timely receipt of the required corrections under PCT Article 11(2):

5. International Searching Authority (if two or more are competent):

ISA /

6. ☐

Transmittal of search copy delayed until search fee is paid.

2. Drawings:

☐ received:

☐ not received:

Date of receipt of the record copy by the International Bureau:

For International Bureau use only

## PCT

## FEE CALCULATION SHEET

## Annex t the Request

For receiving Office use only

International application No.

Date stamp of the receiving Office

Applicant's or agent's  
file reference

MTW 50542/WO

Applicant

QUEST INTERNATIONAL B.V.

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<b>(51) International Patent Classification <sup>6</sup> :</b> <b>C08L 5/14, C08B 37/00, 37/14, C11D 7/00</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 99/36470</b> <b>(43) International Publication Date:</b> 22 July 1999 (22.07.99)
<b>(21) International Application Number:</b> PCT/GB99/00145 <b>(22) International Filing Date:</b> 15 January 1999 (15.01.99) <b>(30) Priority Data:</b> 98300291.6 16 January 1998 (16.01.98) EP <b>(71) Applicant (for all designated States except US):</b> QUEST INTERNATIONAL B.V. [NL/NL]; Huizerstraatweg 28, NL-1411 GP Naarden (NL). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> BERRY, Mark, John [GB/GB]; 2 Fitzwilliam Leys, Higham Ferrers, Rushden, Northamptonshire NN10 8LY (GB). GIDLEY, Michael, John [GB/GB]; 45 Holmes Avenue, Raunds, Northamptonshire NN9 6SZ (GB). DAVIS, Paul, James [GB/GB]; The Hawthorns, Pavenham Road, Felmersham, Bedfordshire MK43 7EX (GB). <b>(74) Agents:</b> HUMPHRIES, Martyn et al.; ICI Group Intellectual Property, P.O. Box 90, Wilton, Middlesbrough, Cleveland TS90 8JE (GB).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> POLYSACCHARIDE CONJUGATES CAPABLE OF BINDING TO CELLULOSE  <b>(57) Abstract</b> <p>A polysaccharide conjugate comprises a polysaccharide attached to a particle carrying perfume, the polysaccharide conjugate being capable of binding to cellulose. Preferred polysaccharides include tamarind seed xyloglucan, locust bean gum and enzyme modified guar. Because the polysaccharide conjugate binds to cellulose, which is present in cotton and other fabrics, paper, etc., binding of the conjugate to cellulose brings the perfume-bearing particle into close proximity to a surface of or containing cellulose. The invention thus enables targeting of perfume-bearing particles to such surfaces. The invention also provides a product incorporating the polysaccharide conjugate of the invention. The product is conveniently a laundry product such as a fabric washing product, e.g. a detergent product, or a fabric conditioning product. The invention also provides a method of targeting binding of a particle carrying perfume to cellulose by use of the polysaccharide conjugate of the invention.</p>		

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## POLYSACCHARIDE CONJUGATES CAPABLE OF BINDING TO CELLULOSE

### Field of Invention

This invention relates to binding of polysaccharides and concerns a cellulose-binding polysaccharide conjugate, products including the polysaccharide conjugate, and targeting methods using the polysaccharide conjugate. In the context of the invention the term "polysaccharide" is intended to cover polysaccharides and oligosaccharides, and references to "polysaccharide" and "polysaccharide conjugate" should be construed accordingly.

### Background to the Invention

10 It is known that various naturally occurring polysaccharides such as pea xyloglucan, tamarind seed xyloglucan, etc bind to cellulose by a polysaccharide:polysaccharide interaction; indeed this binding ability is important in the functioning of plant cell walls.

The paper by Hayashi et al entitled "Pea Xyloglucan and Cellulose" in Plant Physiol. (1987) 83, 384-389 describes investigations of binding of pea xyloglucan to cellulose, using fluorescein-labelled xyloglucan prepared by treating xyloglucan with cyanogen bromide (CNBr) and incubating with fluoresceinamine, and also using radioiodinated xyloglucan prepared by reaction of <sup>125</sup>I with the fluorescein moiety on xyloglucan. These labels were used to trace the binding of the polysaccharide and are among the smallest molecular label entities known.

20 The present invention is based on the surprising discovery that polysaccharides with much larger attached entities than those used by Hayashi et al can still bind rapidly with high efficiency to cellulose by polysaccharide:polysaccharide interaction. This is surprising because binding occurs at multiple sites along the backbones of the polysaccharides, rather than at a single binding site as with antibody-antigen interactions, and it would have been predicted that binding would have been disrupted by the attachment of large entities  
25 to cellulose-binding polysaccharides. The invention thus opens up the possibility of using polysaccharides to target attached particles to cellulose, eg in fabric, paper, etc.

### Summary of the Invention

In one aspect the present invention provides a polysaccharide conjugate comprising a polysaccharide attached to a particle carrying perfume, the polysaccharide conjugate being capable of binding to cellulose.

- 5 The polysaccharide may be one that binds naturally to cellulose or has been derivatised or otherwise modified to bind to cellulose. The polysaccharide may be naturally occurring or synthetic.

- 10 The polysaccharide desirably has a 1-4 linked  $\beta$  glycan (generalised sugar) backbone structure, which is stereochemically compatible with cellulose, such as a glucan backbone (consisting of  $\beta$  1-4 linked glucose residues), a mannan backbone (consisting of  $\beta$  1-4 linked mannose residues) or a xylan backbone (consisting of  $\beta$  1-4 linked xylose residues). Suitable polysaccharides include xyloglucans, glucomannans, mannans, galactomannans,  $\beta$  (1-3), (1-4) glucan and the xylan family incorporating glucurono-, arabino- and glucuronoarabinoxylan. See "Physiology and Biochemistry of Plant Cell  
15 Walls" (1990) by C Brett and K Waldron for a discussion of these materials.

- The minimum chain length requirement for cellulose oligomers to bind to cellulose is 4 glucose units. For xyloglucans, the side chains make the binding less efficient and 12 backbone glucose units (ie. about 25 total sugar units) are required for binding to cellulose. Structural considerations suggest galactomannans are intermediate in binding efficiency,  
20 and about 6 to 8 backbone residues are expected to be required for binding to cellulose. The polysaccharide should thus have at least 4, and preferably at least 10, backbone residues, which are preferably  $\beta$  1-4 linked.

- Naturally occurring polysaccharides that bind rapidly and strongly to cellulose by  
25 polysaccharide:polysaccharide interaction include xyloglucans such as pea xyloglucan and tamarind seed xyloglucan (TXG) (which has a  $\beta$  1-4 linked glucan backbone with side chains of  $\alpha$ -D xylopyranose and  $\beta$ -D-galactopyranosyl-(1-2)- $\alpha$ -D-xylo-pyranose, both 1-6 linked to the backbone:see Gidley et al Carbohydrate Research, 214 (1991) 200-314 for a discussion of the structure of tamarind seed polysaccharide); and galactomannans,  
30 particularly low galactose galactomannans, such as locust bean gum (LBG) (which has a mannan backbone of  $\beta$  1-4 linked mannose residues, with single unit galactose side chains linked  $\alpha$  1-6 to the backbone), enzyme modified guar (EMG) (guar gum has the same structural units as LBG but has a much higher level of galactose substitution, to the extent that there is not enough accessible mannan backbone through which to bind  
35 cellulose. EMG is produced by enzymic removal from guar gum of a controllable

percentage of the galactose residues to produce a range of materials that are capable of binding to cellulose, but are cheaper and more consistently available than LBG. See Bulpin et al Carbohydrate Polymers 12 (1990) 155-168 for a discussion of EMG), tara glactomannan and cassia galactomannan. These materials are commercially available  
5 and thus provide potentially useful sources of suitable polysaccharides. These materials have the advantages of being relatively cheap, and already being accepted for food use.

The polysaccharide desirably has side chain galactose residues susceptible to oxidation by galactose oxidase, for production of an aldehyde group for coupling purposes, as will be described below. TXG, LBG and EMG have such galactose residues.

- 10 The particle may be of a range of materials including silica, particular porous silica, organic polymer etc.

The perfume may be carried by the particle in a variety of ways, including absorption, adsorption, impregnation and encapsulation.

- 15 Absorption of a perfume by particles can be brought about simply by bringing the perfume and the particles into contact, and allowing them to stand. The perfume molecules can enter the particles by diffusion.

An alternative to the use of solid particles is to form hollow capsules in which a shell encapsulates the perfume.

- 20 One approach to the preparation of microcapsules of perfume is to disperse droplets of the perfume in an aqueous phase which contains water soluble polymer, and then form a polymer shell around these perfume droplets by coacervation of the polymer at the interface between the perfume and the aqueous phase. Once formed, the capsule wall usually requires further treatment to strengthen it. The encapsulation of perfume by coacervation has been described by Meyer, A in Chimica, 46, 101 (1992) and in  
25 US-A-5051305.

A second approach to the formation of microcapsules of perfume is to disperse perfume droplets in an aqueous phase, and then bring about a polymerisation reaction at the interface between the droplets and the aqueous phase. The polymerisation reaction which has mostly been employed is the formation of an aminoplast resin. This has been used for

perfume encapsulation, as disclosed in US-A-4681806. A typical procedure for the production of aminoplast resin capsules enclosing perfume is set out in US-A-4234627, which refers back to US-A-3516941.

5 A further possibility is to form solid polymer particles, absorb the perfume into these, and then encapsulate these particles.

Further information on encapsulation techniques is given in Risch, S.J., Reineccius, G.A. (Ed), "Encapsulation and controlled release of food ingredients", ACS symposium series 590, Washington DC, 1995. It is to be noted that not all of the encapsulation techniques described in this reference are necessarily suitable for the preparation of particles for use  
10 in this invention. For instance, spray drying, which is the most widely used encapsulation technique, generally produces water-soluble particles which may not be particularly suitable. However, the person skilled in the art will readily be able to select suitable techniques.

15 The perfume typically constitutes between 1 and 90% of the total weight of the particle, and preferably constitutes at least 5% by weight to be commercially attractive. Using encapsulation techniques, perfume loadings of up to about 70% can be achieved, while absorption techniques, eg using highly absorbing silicas, can achieve loadings of up to about 90%.

20 The nature of the perfume is not critical to the invention. As is well known, a perfume normally consists of a mixture of a number of perfumery materials, each of which has a fragrance. The number of perfumery materials in a perfume is typically ten or more. The range of fragrant materials used in perfumery is very wide; the materials come from a variety of chemical classes, but in general are water-insoluble oils. In many instances, the molecular weight of a perfumery material is in excess of 150, but does not exceed 300.

25 The perfumes used in the present invention can be mixtures of conventional perfumery materials. Perfumery materials which may be used include: acetyl cedrene, 4-acetoxy-3-pentyltetrahydropyran, 4-acetyl-6-t-butyl-1,1-dimethylindane, available under the trademark "CELESTOLIDE", 5-acetyl-1,1,2,3,3,6-hexamethylindane, available under the trademark "PHANTOLIDE", 6-acetyl-1-isopropyl-2,3,3,5-tetramethylindane, available  
30 under the trademark "TRASEOLIDE", alpha-n-amylicinnamic aldehyde, amyl salicylate, aubepine, aubepine nitrile, aurantion, 2-t-butylcyclohexyl acetate, 2-t-butylcyclohexanol,



- 3-(p-t-butylphenyl)propanal, 4-t-butylcyclohexyl acetate, 4-t-butyl-3,5-dinitro-2,6-dimethyl acetophenone, 4-t-butylcyclohexanol, benzoin siam resinoids, benzyl benzoate, benzyl acetate, benzyl propionate, benzyl salicylate, benzyl isoamyl ether, benzyl alcohol, bergamot oil, bornyl acetate, butyl salicylate, carvacrol, cedar atlas oil, cedryl methyl ether, cedryl acetate, cinnamic alcohol, cinnamyl propionate, cis-3-hexenol, cis-3-hexenyl salicylate, citronella oil, citronellol, citronellonitrile, citronellyl acetate,
- 5 citronellyloxyacetaldehyde, cloveleaf oil, coumarin, 9-decen-1-ol, n-decanal, n-dodecanal, decanol, decyl acetate, diethyl phthalate, dihydromyrcenol, dihydromyrcenyl formate, dihydromyrcenyl acetate, dihydroterpinyl acetate, dimethylbenzyl carbinyl acetate,
- 10 dimethylbenzylcarbinol, dimethylheptanol, dimethyloctanol, dimyrcetol, diphenyl oxide, ethyl naphthyl ether, ethyl vanillin, ethylene brassylate, eugenol, florocyclene, geraniol, geranium oil, geranonitrile, geranyl nitrile, geranyl acetate,
- 1,1,2,4,4,7-hexamethyl-6-acetyl-1,2,3,4-tetrahydronaphthalene, available under the trademark "TONALID", 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta-
- 15 2-benzopyran, available under the trade mark "GALAXOLIDE", 2-n-heptylcyclopentanone, 3a,4,5,6,7,7a-hexahydro-4,7-methano-1(3)H-inden-6-ylpropionate, available under the trademark "FLOROCYCLENE", 3a-4,5,6,7,7a-hexahydro-4,7-methano-1(3)H-inden-
- 6-ylacetate, available under the trademark "JASMACYCLENE",
- 4-(4'-hydroxy-4'-methylpentyl)-3-cyclohexenecarbaldehyde, alpha-hexylcinnamic
- 20 aldehyde, heliotropin, Herculyn D, hexyl aldol, hexyl cinnamic aldehyde, hexyl salicylate, hydroxycitronellal, i-nonyl formate, 3-isocamphylcyclohexanol, 4-isopropylcyclohexanol, 4-isopropylcyclohexyl methanol, indole, ionones, irones, isoamyl salicylate, isoborneol, isobornyl acetate, isobutyl salicylate, isobutylbenzoate, isobutylphenyl acetate, isoeugenol, isolongifolanone, isomethyl ionones, isononanol, isononyl acetate, isopulegol, lavandin oil,
- 25 lemongrass oil, linalool, linalyl acetate, LRG 201, 1-menthol,
- 2-methyl-3-(p-isopropylphenyl)propanal, 2-methyl-3-(p-t-butylphenyl)propanal,
- 3-methyl-2-pentyl-cyclopentanone, 3-methyl-5-phenyl-pentanol, alpha and beta methyl naphthyl ketones, methyl ionones, methyl dihydrojasmonate, methyl naphthyl ether, methyl 4-propyl phenyl ether, Mousse de chene Yugo, Musk ambrette, myrtenol, neroli oil,
- 30 nonanediol-1,3-diacetate, nonanol, nonanolide-1,4, nopol acetate,
- 1,2,3,4,5,6,7,8-octahydro-2,3,8,8-tetramethyl-2-acetyl-naphthalene, available under the trademark "ISO-E-SUPER", octanol, Oppoponax resinoid, orange oil,
- p-t-amylcyclohexanone, p-t-butylmethylhydrocinnamic aldehyde, 2-phenylethanol, 2-phenylethyl acetate, 2-phenylpropanol, 3-phenylpropanol, para-menthan-7-ol,
- 35 para-t-butylphenyl methyl ether, patchouli oil, pelargene, petitgrain oil, phenoxyethyl isobutyrate, phenylacetaldehyde diethyl acetal, phenylacetaldehyde dimethyl acetal,

phenylethyl n-butyl ether, phenylethyl isoamyl ether, phenylethylphenyl acetate, pimento leaf oil, rose-d-oxide, Sandalone, styrallyl acetate, 1,1,4,4-tetramethyl-6-acetyl-7-ethyl-1,2,3,4-tetrahydronaphthalene, available under the trademark "VERSALIDE", 3,3,5-trimethyl hexyl acetate, 3,5,5-trimethylcyclohexanol, terpineol, terpinyl acetate, 5 tetrahydrogeraniol, tetrahydrolinalool, tetrahydromuguol, tetrahydromyrcenol, thyme oil, trichloromethylphenylcarbiny acetate, tricyclodecenyl acetate, tricyclodecenyl propionate, 10-undecen-1-al, gamma undecalactone, 10-undecen-1-ol, undecanol, vanillin, vetiverol, vetiveryl acetate, vetyvert oil, acetate and propionate esters of alcohol in the list above, aromatic nitromusk fragrances, indane musk fragrances, isochroman musk fragrances, 10 macrocyclic ketones, macrolactone musk fragrances, and tetralin musk fragrances.

The perfume may be present in known manner in solvents or diluents, such as ethanol, isopropanol, diethylene glycol monoethyl ether, dipropylene glycol, diethyl phthalate and triethyl citrate.

15 Perfumes which are used in this invention may, if desired, have deodorant properties, for example, as disclosed in US-A- 4303679, US-A-4663068 and EP-A-545556.

If the particles are solid particles which are impregnated with perfume after manufacture, the absorption of perfume can be enhanced by choosing perfumery materials with a hydrophobic character or mixing a hydrophobic oil into the perfume. Examples of hydrophobic oils which can enhance perfume uptake are dibutylphthalate, alkane mixtures 20 such as isoparaffin and di ( $C_8$ - $C_{10}$  alkyl) propylene glycol diester.

The particles suitably have a diameter in the range 0.5 to 100 microns. The lower end of this range (0.5 to 5 microns) covers small colloidal particles and molecular complexes.

The particle may be attached to the polysaccharide by a range of physical or chemical means.

25 Polysaccharide is conveniently physically attached to particles, eg by adsorption. For example, porous silica particles have surface properties that enable firm adsorption of polysaccharide.

Chemical attachment techniques may also be used. For particles carrying surface amino groups, attachment can be by a number of techniques. For example, amino groups are

conveniently chemically linked to polysaccharides having galactose side chains by enzymically oxidising the galactose, eg using galactose oxidase, to produce an aldehyde group to which an amino group of a particle can be chemically linked. As noted above, TXG, LBG and EMG have suitable galactose side chains. For polysaccharides not having

5 suitable galactose side chains, different methods of chemical linking of amino groups can be used. Alternative techniques include limited periodate oxidation, which requires the polysaccharide to have two adjacent hydroxyl groups in cis orientation, and results in the production of aldehyde groups which can be reductively aminated. A further possibility is reaction with cyanogen bromide (CNBr) which inserts into sugar rings at vicinal diols, both

10 in the backbone and side chains, to provide an isourea linkage to amino groups. It is preferred to use chemical techniques that do not affect the polysaccharide backbone length, which would reduce the cellulose-binding capability of the polysaccharide. For particles with surface carboxyl or hydroxyl groups, other known forms of chemical linkage may be used. As a further possibility, where the particle is a liposome or micelle,

15 hydrophobic tails fixed to the polysaccharide can be inserted therein.

Because the polysaccharide conjugate binds to cellulose, which is present in cotton and other fabrics, paper, etc, binding of the conjugate to cellulose brings the attached particle carrying perfume into close proximity to a surface of or containing cellulose. The invention thus enables targeting of perfume-bearing particles to such surfaces.

20 This targeting function finds particular practical applications, in targeting of particles containing perfume to bind to fabric. The perfume may be adsorbed, impregnated or encapsulated in the particle. Polysaccharide-particle conjugates of this sort thus find use as ingredients in laundry products, such as fabric washing products and fabric conditioning products, and also personal products, eg. for targeting perfume to bind to clothes. Another

25 potential use is in paper products, such as disposable paper wipes.

In a preferred embodiment, the particles are porous and contain perfume in the pores. This embodiment involves filling the pores of the particles with the perfume and then blocking the pores with a coating of the polysaccharide so that the perfume does not come out of the particle again easily. It may, however, be possible to effect perfume release if

30 desirable, eg by ironing. Moreover, the coating has the combined effect of sealing the perfume in the pores and giving the particles a specific affinity for cellulose or cellulose-containing surfaces.

The invention may also be used for targeting perfume-bearing particles to bind paper to produce perfumed paper.

5 An additional benefit of the invention arises from the fact that, unlike most other targeting molecules, cellulose-binding polysaccharides are especially robust. Proteins such as cellulose binding domain can be inactivated (denatured) by heat or aggressive surfactants, while polysaccharides such as LBG, TXG, etc are completely unaffected by such treatments. The polysaccharide conjugates of the invention thus offer the considerable advantage of extra stability and product compatibility compared with other targeting molecules.

10 In a further aspect, the present invention provides a product incorporating a polysaccharide conjugate in accordance with the invention.

The product is conveniently a laundry product such as a fabric washing product, eg a detergent product, or a fabric conditioning product.

15 The invention also finds application in personal products, eg for targeting perfume to bind to clothes.

The product may otherwise be of generally conventional formulation, as is well known to those skilled in the art. For a discussion of known detergent compositions see, for example, WO 95/34628, particularly pages 11 to 15.

20 The present invention also provides a method of targeting binding of a particle carrying perfume to cellulose by use of a polysaccharide conjugate in accordance with the invention.

The invention will be further described by way of illustration, in the following Example.

#### EXAMPLE 1

Binding of Locust Bean gum (LBG) to fragrance-enriched particles for targeting to fabric.

#### 25 MATERIALS AND METHODS

##### Preparation of particles

Porous silica particles (mean pore-size 2nm, average particle size 9  $\mu$ m) were obtained from Joseph Crosfield & Sons (Warrington U.K.). Approximately 25 mgs of silica was placed in each of two round-bottom plastics tubes. 0.5mls of the fragrance florocyclene (obtained from Quest International, Ashford U.K.) was added to each of the tubes and  
5 mixed thoroughly. The lids of the tubes were sealed to prevent evaporation of the fragrance.

The two tubes were rotated overnight with a gentle tumbling motion to allow the fragrance molecules to enter the pores of the particles. This was done at ambient temperature.

The tubes were centrifuged for 5 minutes [13,000 r.p.m. in a microcentrifuge (MSE)] and  
10 the supernatants discarded. Each of the two tubes then received a different treatment in which 1mls of one of the following was added.

- a) 1mls of 0.1% LBG (Sigma Product No. G-0753)
- b) 1mls of purified water.

The two tubes were mixed thoroughly and then rotated overnight at ambient temperature.  
15 After the overnight treatment, the tubes were centrifuged as before and the supernatants removed. The particles were washed once in water and then twice in saline (pH 7). The particles were then resuspended in 1mls saline (pH 7) and left at ambient temperature until required. There were therefore two different slurries, each containing approximately 25 mgs of silica in 1mls of saline. The slurries were designated a) or b) depending on the  
20 treatment received as set out above.

#### Targeting the particles to fabric

Two squares (approximately 1cm x 1cm) were cut from white cotton cloth.

2mls of saline was added to each of two plastics tubes. 100  $\mu$ l of slurry a) was added to one; 100  $\mu$ l of slurry b) was added to the other. One cotton square was added to each of  
25 the two tubes a) and b).

The two tubes were rotated slowly at room temperature for two hours; after which the cotton squares were removed with tweezers. Each square was placed in a separate Petri dish. The lids of the Petri dishes were used to prevent evaporation of the fragrance.

RESULTS

Eight people were asked to compare cotton squares treated with slurry a) and slurry b) and decide which of the cotton squares smells the strongest.

- 6 out of 8 said that a) was the strongest
- 5 1 out of 8 said that b) was the strongest
- 1 out of 8 could not tell the difference.

It was concluded that the cotton square treated with slurry a) had more fragrance on it due to the targeting effect of the LBG.

Claims

1. A polysaccharide conjugate comprising a polysaccharide attached to a particle carrying perfume, the polysaccharide conjugate being capable of binding to cellulose.
2. A conjugate according to claim 1, wherein the polysaccharide has a 1-4 linked  $\beta$  glycan backbone structure.
3. A conjugate according to claim 2, wherein the polysaccharide has a glucan backbone, a mannan backbone or a xylan backbone.
4. A conjugate according to claim 3, wherein the polysaccharide is selected from xyloglucans, glucomannans, mannans, galactomannans,  $\beta$  (1-3), (1-4) glucan and the xylan family incorporating glucurono-, arabino- and glucuronoarabinoxylan.
5. A conjugate according to claim 4, wherein the polysaccharide is selected from xyloglucans such as tamarind seed xyloglucan (TXG) and pea xyloglucan; and galactomannans, particularly low galactose galactomannans, such as locust bean gum (LBG), enzyme modified guar (EMG), tara galactomannan and cassia galactomannan.
6. A conjugate according to any one of the preceding claims, wherein the polysaccharide has side chain galactose residues susceptible to oxidation by galactose oxidase.
7. A conjugate according to any one of the preceding claims, wherein the particle is physically linked to the polysaccharide.
8. A product incorporating a polysaccharide conjugate in accordance with any one of the preceding claims.
9. A product according to claim 8, comprising a laundry product such as a fabric washing product, eg a detergent product, or a fabric conditioning product.
10. A method of targeting binding of a particle carrying perfume to cellulose by use of a polysaccharide conjugate in accordance with any one of claims 1 to 7.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/00145

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 6 C08L5/14 C08B37/00 C08B37/14 C11D7/00

According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C08L C08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI Week 8634 Derwent Publications Ltd., London, GB; AN 86-223138 XP002069370 &amp; JP 61 155307 A (LION CORP), 15 July 1986 see abstract</p>	1,7-9
A	<p>EP 0 439 373 A (PFIZER INC.) 31 July 1991 see page 2, line 51 - line 53 see claims 1,5,6</p>	1,7,8



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

13 April 1999

Date of mailing of the international search report

26/04/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Mazet, J-F



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/00145

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI  Week 8631  Derwent Publications Ltd., London, GB;  AN 86-201034  XP002069371  &amp; JP 61 133299 A (LILAC KENKYUSHO KK)  , 20 June 1986  see abstract</p>	1-4, 7-9
A	<p>US 2 949 397 A (T. H. WERNER)  16 August 1960  see claims</p>	1-5, 7, 8, 10
A	<p>US 3 297 604 A (F. J. GERMINO)  10 January 1967  see claims</p>	1-6

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/00145

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 439373	A	31-07-1991	AU 664593 B	23-11-1995
			AU 3391293 A	13-05-1993
			AU 7006991 A	08-08-1991
			CA 2035325 A,C	27-07-1991
			PT 96587 A	15-10-1991
US 2949397	A	16-08-1960	BE 540485 A	
			BE 540486 A	
			CH 349155 A	
			CH 349881 A	
			DE 1067296 B	
			DE 1078426 B	
			FR 1139589 A	02-07-1957
			FR 1139590 A	02-07-1957
			GB 778791 A	
			GB 810828 A	
			NL 107598 C	
US 3297604	A	10-01-1967	NONE	

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>MTW 50542/WO</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 99/ 00145</b>	International filing date (day/month/year) <b>15/01/1999</b>	(Earliest) Priority Date (day/month/year) <b>16/01/1998</b>
Applicant <b>QUEST INTERNATIONAL B.V. et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.  
☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

- ☐ the text is approved as submitted by the applicant.
- ☒ the text has been established by this Authority to read as follows:

**POLYSACCHARIDE CONJUGATES CAPABLE OF BINDING TO CELLULOSE**

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

- ☐ as suggested by the applicant.
- ☐ because the applicant failed to suggest a figure.
- ☐ because this figure better characterizes the invention.

☐ None of the figures.

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 99/00145

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 C08L5/14 C08B37/00 C08B37/14 C11D7/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 C08L C08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI Week 8634 Derwent Publications Ltd., London, GB; AN 86-223138 XP002069370 &amp; JP 61 155307 A (LION CORP), 15 July 1986 see abstract</p> <p style="text-align: center;">---</p>	1,7-9
A	<p>EP 0 439 373 A (PFIZER INC.) 31 July 1991 see page 2, line 51 - line 53 see claims 1,5,6</p> <p style="text-align: center;">---</p> <p style="text-align: center;">-/--</p>	1,7,8

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
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- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

13 April 1999

Date of mailing of the international search report

26/04/1999

Name and mailing address of the ISA

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Authorized officer

Mazet, J-F

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 99/00145

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI Week 8631 Derwent Publications Ltd., London, GB; AN 86-201034 XP002069371 &amp; JP 61 133299 A (LILAC KENKYUSHO KK) , 20 June 1986 see abstract</p>	1-4, 7-9
A	<p>US 2 949 397 A (T. H. WERNER) 16 August 1960 see claims</p>	1-5, 7, 8, 10
A	<p>US 3 297 604 A (F. J. GERMINO) 10 January 1967 see claims</p>	1-6

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/00145

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 439373	A	31-07-1991	AU 664593 B AU 3391293 A AU 7006991 A CA 2035325 A,C PT 96587 A	23-11-1995 13-05-1993 08-08-1991 27-07-1991 15-10-1991
US 2949397	A	16-08-1960	BE 540485 A BE 540486 A CH 349155 A CH 349881 A DE 1067296 B DE 1078426 B FR 1139589 A FR 1139590 A GB 778791 A GB 810828 A NL 107598 C	02-07-1957 02-07-1957
US 3297604	A	10-01-1967	NONE	

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

17

Applicant's or agent's file reference MTW 50542/WO	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB99/00145	International filing date (day/month/year) 15/01/1999	Priority date (day/month/year) 16/01/1998
International Patent Classification (IPC) or national classification and IPC C08L5/14		
Applicant QUEST INTERNATIONAL B.V. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 7 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  28/07/1999	Date of completion of this report  05.04.2000
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Contet, F  Telephone No. +49 89 2399 8671  

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/00145

## I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

### Description, pages:

1-10 as originally filed

### Claims, No.:

1-10 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Yes:	Claims 1-4, 6-10
	No:	Claims
Inventive step (IS)	Yes:	Claims
	No:	Claims 5
Industrial applicability (IA)	Yes:	Claims 1-10
	No:	Claims



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/00145

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**2. Citations and explanations**

**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following documents :

- D1 : DATABASE WPI Week 8634 Derwent Publications Ltd., London, GB; AN 86-223138 XP002069370 & JP 61 155307 A (LION CORP), 15 July 1986 and the PAJ abstract (see copy joined)  
D2 : EP-A-0 439 373 (PFIZER INC.) 31 July 1991  
D3 : US-A-2 949 397 (T. H. WERNER) 16 August 1960

**I-Novelty :**

1.1 : Present Claim 1 is concerned with "a polysaccharide conjugate comprising a polysaccharide attached to a particle carrying perfume". Neither the term "conjugate" nor the term "attached" gives a clear indication on how the polysaccharide and the particle are bound. The further feature, that said conjugate is capable of binding to cellulose, is not considered as a characterising feature of the invention (see the reasons in Item VIII).

More precisely according to the application page, 3, l.10 to 13, a particle (e.g. a silica, porous silica or organic polymer ) carrying perfume is prepared. The various modes of preparing such particles are disclosed on p.3, l.14 to p.4, l.5 (absorption, adsorption, encapsulation by coacervation or microencapsulation).

b) "The particles thus obtained are then attached to the polysaccharide by a range of physical or chemical means." (page 6, lines 23 to p.7, l.15). For instance "in a particular embodiment, the particles are porous and contain perfumes in the pores.". Further the pores are blocked with a coating of the polysaccharide (page 7, l.26-29).

c) Further according to p.1, l.10-12, it was already known to bind various naturally occurring polysaccharides to cellulose by a polysaccharide-polysaccharide interaction and this ability is used "to target perfumes to cellulose-containing surfaces such as fabric (even in the presence of detergent" (p. 7, l.16-19 and answer, p.1, par.3).

**1.2 :** D1 discloses oil-containing powdery particles that are prepared by allowing petal-like silica of high oil absorption to absorb an hydrophobic oil and coating the silica with a water-soluble polymer on their surfaces. The product obtained demonstrates high stability of the hydrophobic oil. When applied, the oil properties develop sufficiently.

Thus a 100 pts. by wt. of petal-like **silica** (average particle size 0.1 - 50  $\mu\text{m}$ ) is allowed to absorb 10 - 1,000 pts. by wt. of a hydrophobic oil such as avocado oil, vitamins, lanolin, fluid paraffin, vaseline, synthetic esters, silicone oil, **jasmine oil or lavender oil** and the resultant silica is coated with a water-soluble polymer such as starch, sodium alginate, pectin, carrageenin, arabic gum, dextrin, methylcellulose or synthetic polymer such polyvinyl alcohol, polyacrylamide, to give the desired oil-containing powdery particles.

Said a polysaccharide conjugate comprising a polysaccharide attached to a particle carrying perfume", when dissolved in cold or hot water.

**1.2 :** It appears that the disclosure according to D1 does not differ from the previous points a) and b) and novelty of the subject-matter of present Claim 1 cannot be acknowledged over D1.

Further the polysaccharide as defined in present Claims 2 to 4 do not exclude the polysaccharides according to D1 and are not able to establish a difference over D1. Thus the feature according to present Claim 6, that the polysaccharide of the conjugate has "side chain galactose residues susceptible to oxidation by galactose oxidase." is necessarily included in the teaching of D1.

D1 discloses further the use for detergents. Thus the problem of "improving delivery of perfume to cellulose-containing surfaces such as fabric" addressed by the application (see present Cl. 9 and the Applicant's answer ") was already solved by D1. For the same reason, the method disclosed in present Claim 10 was also implicitly disclosed by D1.

**Thus novelty of the subject-matter of present Claims 1 to 4, 6 to 10 cannot be acknowledged over D1.**

**1.3 :** D2 discloses the preparation of a particulate porous material containing calcium carbonate (size 5-300 microm., p.2, l.38-40) useful as a carrier for

fragrances (p.2, l. 51-53). A carbohydrate can be added as a binder to the calcium carbonate, e.g. gums, cellulose ( Cl.5 and 6 ). Thus the polysaccharide is added to the calcium carbonate  $\text{CaCO}_3$  and mixed vigorously until an homogeneous mixing of the binder is reached ( p.3, l.8-15).

In the present application, the carbohydrate is applied as a coating onto the particle carrying perfume, instead of being admixed with both the calcium carbonate and the fragrance. But this difference is not clearly expressed in present Claim 1 (a polysaccharide attached to a particle carrying perfume ..).

Thus novelty of the subject-matter of present Claim 1 is not clearly established over D2.

Keeping point 1.1 in mind, the definition of the conjugate product according to present Claims 1-4 and 7 is not able to establish a clear difference over D2 (see Item VIII).

## **II- Inventive step :**

**2.1 :** The document D1 is regarded as being the closest prior art to the subject-matter of claim 5, since it addresses the same problem of having stable oil products able to develop the properties of the oil, when it is applied.

The product claimed differs from the product obtained according to D1 in the selection of definite polysaccharides used for coating the particles.

It is not clear which problem has been solved.

If the effect obtained was to improve the ability to bound to cellulose and thus the targeting effect. In such a case D3 seems relevant

**2.2 :** The document D3 discloses the preparation of a loading agent for paper (col. 1, lines 38-40 and col.2, l.9 to 31). Thus accordingly, the filler particles usually used may be **precoated** with a gum which is substituted mannans, e.g. **galactomannans** such as the locust bean gum or guar gum of present Claims 2 to 6 (col.5, l.20 - 43).

This coating on each particle causes the coated particle to be attracted to the cellulose fibre (col.3, l.10-14).

Thus cellulose fibres are beaten and suspended in water. The precoated particles are then added to the suspension and mixed. Said particles are attracted to the cellulosic fibres in the aqueous suspension (Claim1; col.3, l. 39 - 71 and the Ex.).

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/GB99/00145

The retention of the filler is an exceptional result (Ex.3, col.9, l.34 and the other Ex.).

The product claimed differs therefrom only in that a perfume has been introduced in the porous particle but the desired targeting effect between a polysaccharide and cellulose was clearly disclosed.

**2.3 : Thus having regard to these both documents D1 and D3, the obtention of the desired effect can be considered as expected and the subject-matter of the present application cannot be deemed to be inventive.**

**III- Industrial applicability :**

A polysaccharide conjugate comprising a polysaccharide attached to a particle carrying perfume useful in fabric washing product.

**Re Item VII**

**Certain defects in the international application**

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

**Re Item VIII**

**Certain observations on the international application**

The feature, the conjugate is capable of binding cellulose, is according to the applicant a "functional requirement " of the claimed entity and not a statement of the underlying problem (answer, p.1, last par.). But both cases, the definition by the result to be achieved or the functional statement, do not enable the skilled person to determine which technical features are necessary to perform the stated function.

Thus Claim 1 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined and the technical features necessary for achieving this result should be added.